

# Space News Roundup

Vol. 26 No. 6

March 20, 1987

National Aeronautics and Space Administration

## Mars sample return may be 'pathfinder' for manned mission

JSC and the Jet Propulsion Laboratory may become partners in a mission to send an unmanned spacecraft to Mars and return samples to the Earth as a precursor to manned Mars exploration, NASA officials said at the 18th Lunar and Planetary Science Conference.

Mars exploration is gaining prominence as the kind of "bold initiative" that will break the United States space program out of its current underfunded track, agreed JSC Director Aaron Cohen, JPL Director Lew Allen and Dr. Geoffrey Briggs, director of NASA's Solar System Exploration Program.

Converging the talents of NASA's manned and unmanned space exploration experts could provide valuable scientific information and allow testing of many concepts necessary to expanding the human presence in the solar system, they added.

"If we want to be able to carry out tasks on the moon or Mars, we must have a firm base in science," Cohen said. "Lew Allen and I agree that by working together, we can learn much from this (Mars sample return) mission."

Briggs and Allen said that NASA Director James Fletcher is still deciding what projects will fulfill the three goals he has set for NASA — assuring a safe, reliable Space Shuttle, establishing a permanent manned presence in space through the Space Station and expanding the human presence in the solar system. The project in direct competition with exploration of Mars is establishment of a manned lunar base, they said.

"We do see the pace heating up when it comes to Mars because our Soviet colleagues are clearly

embarked upon a major Mars program," Briggs said. "We shouldn't plan on simply leaving the inner solar system, and Mars in particular, to our colleagues there to explore."

Allen said any bold NASA initiative must be a logical step toward fulfilling the goal of expanded human presence in the solar system. The evidence is beginning to show that a lunar base is not an "essential precursor" to that goal and the focus, therefore, is sharpening on Mars and planetary exploration in general.

"If so, then it will be a vision against which one will key the future of NASA," Allen said.

Assessments of NASA's goals since the *Challenger* accident have concluded that building a space infrastructure through the Space Shuttle and Space Station is important to the future of the country, but it is not an end unto itself, Cohen said. He called the Mars sample return mission a small but important "pathfinder" mission.

Plans call for JSC to conceptually study Mars entry, landing and ascent, and support science strategy and sampling techniques development. JPL would be responsible for overall project management, as well as study of the Mars orbiter and mobile vehicle rover. The mission being studied contemplates a new start in 1993, launch in 1998 and sample return by 2001.

Briggs also said a decision to delay the Mars Observer mission from 1990 to 1992 has been "put on hold for a couple of weeks."

"We're looking at ways to find a Titan launch vehicle that puts less burden on the 1987 and 1988 budgets," he said.



A member of the "Planetary Exploration in the 1990s and Beyond" panel discussion audience talks with participants after the discussion in Teague Auditorium. Panel members, from left, are Lew Allen, Geoffrey Briggs, Aaron Cohen and Mike Duke.

## Soviets plan several Mars missions

Soviet scientists outlined a tentative 10- to 15-year program of unmanned Mars exploration — culminating in a 1998 sample return — at the 18th Lunar and Planetary Science Conference at JSC.

Dr. Valeriy Barsukov, director of the Vernadsky Institute for Geochemistry and Analytical Chemistry, said plans being discussed include launching one small Mars lander and a probe of the Martian moon Phobos in 1988, a balloon to skip over the Mars surface in 1992 and a rover/sample return vehicle in 1994. He said samples could be returned to Earth by 1996 or 1998.

When asked if the Soviets planned a manned Mars mission, Barsukov hedged, noting that such a journey would take two and a half to three years round trip.

"When our cosmonauts have flown around the Earth for three years, then let's decide whether to fly to Mars," he said.

The first mission would place a lander at a pre-designated site on the Martian surface to study soil chemistry, and send a probe to within 200 feet of the Phobos surface. The second would send a double-shelled balloon, the inner shell filled with helium and the outer with carbon dioxide, armed with a mechanism to penetrate the soil. The balloon would rise to six kilometers above the surface during the day, recording high resolution images, and land at night to take samples. It is being designed to cover as much as 5,000 kilometers through 10 cycles, he said.

The next mission would send robot "moles" that could penetrate the Martian surface 20 to 30 meters, perform chemical soil analysis and search for biological activity. The last would send a more sophisticated rover to collect soil samples, and a spacecraft to return the samples to Earth.

Barsukov's comments came during a panel discussion on "Future Exploration of Mars." Dr. Bruce Murray, professor of planetary science at the California Institute of Technology and former JPL director, and Dr. Hal Masursky, an astrogeologist from the U.S. Geological Survey, also made presentations during the discussion led by Dr. Louis Friedman, executive director of The Planetary Society.

Murray suggested that the objective of sample return missions should be to pave the way for humans to land on Mars by 2010 or 2020.

While complimenting the Soviet plans, Masursky said that the technology needed to drive unmanned rovers is lagging behind predictions. He said lunar experience showed that anything an unmanned rover could do, men could do better. On Mars, he said, the presence of humans could be even more useful than it had been on the moon.

## Science director to retire

Dr. Joseph P. Kerwin, 55, director of Space and Life Sciences at the NASA Johnson Space Center, Houston will retire from NASA and the U.S. Navy effective March 31, 1987.

Kerwin will start work in April with Lockheed Missiles and Space Company, Sunnyvale, Calif.

Selected in 1965 as a scientist-astronaut, Kerwin was science pilot on the 28-day first manned visit to Skylab in May-June, 1973. Kerwin and Charles Conrad, Jr. spacewalked to free a jammed solar power

panel and to repair other damage sustained during Skylab's launch three weeks earlier.

Kerwin, a captain, was named JSC Director of Space and Life Sciences in December 1983 after returning from a year and a half as NASA senior science representative in Australia.

Born in Oak Park, Ill., Kerwin earned a bachelor of arts (philosophy) degree from College of the Holy Cross, Worcester, Mass.; a doctor of medicine degree from Northwestern University Medical

School, Chicago; and attended the U.S. Navy School of Aviation Medicine at Pensacola, Fla., where he qualified as a naval flight surgeon. He earned his naval aviator's wings at Beeville Naval Air Station, Texas, in 1962 and has logged more than 4500 flight hours. He is a Captain.

Kerwin and his wife, the former Shirley Ann Good of Danville, Pa., have three daughters.



Joseph Kerwin

## Bolden to head Safety

Astronaut Charles F. Bolden, Jr. has been appointed Chief of the Safety Division at JSC.

Bolden succeeds Jerome B. Hammack, who has been appointed assistant to the Director of Safety, Reliability and Quality Assurance for Assurance Technology Development at JSC.

Bolden, a Marine Corps colonel, came to NASA in May 1980 as an astronaut candidate. Since completing a year-long training and evaluation period he has held a variety of assignments within the Astronaut

Office. He was pilot of the Space Shuttle *Columbia* on STS 61-C in January 1986. Most recently he has served as Special Assistant to the JSC Center Director. Bolden will be eligible to fly Space Shuttle missions.

Hammack, in his new position, will be primarily responsible for advance planning, investigating and developing new technologies.



Charles Bolden

## Employee teams get applause for efforts

More than 200 civil service and contractor members of JSC-NASA Employee Teams (NETs) were recognized recently for their efforts to enhance work processes or systems.

Paul Weitz, deputy director, presented a JSC Honorary Group Achievement Award to each of the 21 teams, specifically citing each team's contributions, at a Feb. 25 ceremony in Teague Auditorium. More than 450 employees and managers attended.

In making the presentations, Weitz said Director Aaron Cohen is supportive of the NETs concept.

"We are getting very positive results," Weitz said. "Go forth and

tell other folks so the enthusiasm will spread."

Special guest speakers were Larry Elton, manager of Boeing Houston Operations, and Dr. Michael B. Duke, chief of JSC's Solar Systems Exploration Division.

Noting that America has increasing competition in space, Elton said that "the most important contribution that each of us can make is to work smarter and get more and better products for less money." He pointed out that one of the most effective ways to improve productivity is to have quality at every work place. He applauded the involvement and structured problem-solving approach used by NETs.

Boeing and JSC employees are working together in two teams. One team is rewriting the JSC manual for certification and recertification of ground-based pressure vessels and systems. The team intends to make the manual more user-oriented to increase productivity and safety.

The Flight Equipment Processing Contract (FEPC) NET made up of managers and supervisors developed a users guide for the FEPC action desk, a primary interface between users and FEPC personnel. Elton said the project not only improved action desk operations, but also opened communication so that the NET's members are more willing to

discuss other mutual problems.

"Be patient," Elton said. "Sometimes it seems like the answers to problems don't come as fast as you would like — but remember ... just working the problem brings many benefits and if you keep at it you will eventually achieve your goals."

Duke said NET activity in the Solar Systems Exploration Division had been successful in addressing real problems and improving the division as a whole in spite of its decentralized nature and non-repetitive research-oriented tasks.

Made up of JSC and Lockheed employees, the team produced a revised, well-documented set of simplified procedures for the sup-

port contractor job order financial management process that cut the time needed to complete paperwork. The team also studied the division's computer capabilities and made recommendations that led to formation of a division computer working group to improve communication and establish priorities for computer system acquisition and utilization.

"Benefits from the NET go beyond the solution of the immediate problems," Duke said, citing improved communication, better organization relationships, greater tolerance for differences of opinion and increased levels of cooperation and trust.

(Continued on page 2)

# Advisory Council recommends mixed launch fleet

NASA should acquire a diversified fleet of expendable launch vehicles (ELVs) and shift as much cargo to them as possible to preserve the Space Shuttle for missions requiring its unique capabilities, according to a recent recommendation by the NASA Advisory Council.

The recommendations were contained in a study of issues involved in creating a "mixed fleet" of Space Shuttles and ELVs.

Daniel J. Fink, council chairman,

urged NASA Administrator Dr. James C. Fletcher to quickly seek a supplementary budget to begin ELV acquisition. Without immediate action, "the nation's civil space program — especially that in space science, which until now has been a shining example of U.S. space leadership — will be damaged to a degree from which recovery will be extremely difficult and expensive," Fink said.

The study placed substantial emphasis on space science, which

has suffered considerably from the 2-year delay in the Shuttle program and the unavailability of a fleet of ELVs. Creating a "robust and resilient capability" with an adequate fleet of ELVs could get a number of important science missions into orbit two to four years earlier than currently planned, the study said.

The cost of an ELV fleet should be considered in relation to the "enormous budgetary costs, opportunity costs and program dis-

ruption of the current unplanned for stand-down," the council said.

The study was undertaken by the council at the agency's request. A task force headed by council member Jasper Welch, a physicist and head of an aerospace consulting firm, conducted the study endorsed by the full council.

The final report identified and discussed issues and made eight major recommendations regarding Shuttle use policy, acquisition of ELVs

including a new heavy-lift vehicle, Shuttle flight frequency, planning for stand-downs, definition of NASA and DOD roles, identification of program constraints, evaluation of the upper stage fleet and encouragement of commercial activities.

The council is the senior external advisory body to NASA and its Administrator. Its 25 members are prominent in such fields as science, industry, education, communication and others.

## Bulletin Board

### On-site blood drive will be Tuesday

The first JSC blood drive of 1987 will be from 8 a.m. to noon, and 1 to 4 p.m. Tuesday, March 24, at the Gilruth Recreation Center. For appointments, call Bob Jones, x33004, or Mary O'Rear, x36508. For more information, call Helon Crawford, x35955.

### Instrument Trade Show slated for Thursday

The 10th annual Instrument Trade Show sponsored by the Clear Lake-Galveston section of ISA will feature table-top presentations of the latest instrument lines from more than 100 manufacturers from the Gulf Coast area. The show begins at 3 p.m. Thursday, March 26, at the Nessler Center in Texas City. Registrants will be eligible for door prizes, and food and drinks will be available.

### Lunar observatories subject of seminar

A seminar on "Future Astronomical Observatories on the Moon" led by Dr. Jack Burns of the University of New Mexico will be presented at 1:30 p.m. Thursday, March 26, in the Lunar and Planetary Institute's Berkner Room.

### Aldrich to speak at Thursday AIAA meeting

Arnold Aldrich, director of NASA's National Space Transportation System, will present a Space Shuttle status report to members of the American Institute of Aeronautics and Astronautics on Thursday, March 26, at the Gilruth Recreation Center. Social hour begins at 5:30 p.m., dinner at 6:30 p.m., and the program at 7:30 p.m. Cost is \$8 for members and spouses, \$10 for non members or \$7 for students. Reservation deadline is noon March 23.

### Management in technical environment is lunch topic

Robert Young, president of LEMSCO, will discuss how to be a good manager in a technical environment at the March 24 Space Systems Technical Committee Lunch and Learn meeting in the Bldg. 3 cafeteria. The meeting begins at 11:30 a.m. For more information, contact John Trebes, x36302, or Chris Cummins, x30354.

### AIAA seeks abstracts for May symposium

The Houston Section of the American Institute of Aeronautics and Astronautics has issued a call for abstracts for the 12th Annual Technical Symposium to be held May 14. The theme for 1987 is "Space Frontiers New Beginnings," and the deadline for submission of abstracts is Friday, April 3. Submissions should include a company affiliation and telephone number. Abstracts or inquiries may be directed to Walter Lueke, Code ES36, x35939.

### Aerospace computer security papers sought

Technical papers, panel concepts and tutorials that address the application of computer security technologies in aerospace are being solicited for the Third Aerospace Computer Security Conference. The conference, scheduled for Dec. 8-11, 1987, at the Sheraton World Hotel in Orlando, Fla., is sponsored by the American Institute of Aeronautics and Astronautics (AIAA), the American Society for Industrial Security and the IEEE Computer Society. Sessions at the classified level are planned. Unclassified copies of final abstracts of approximately 1,000 words must be mailed before May 20. For more information, contact Sharon Graybill at 333-2957.

## Gilruth Center News

Call x30304 for more information

**Beginning tennis** — Learn the fundamentals of tennis. Eight-week class starts March 30 and meets every Monday from 5:15 to 6:45 p.m. Cost is \$32.

**Weight safety** — This is a required course for those employees wishing to use the Rec Center weight room. The class will be held April 8 and April 23 from 8 to 9:30 p.m. Cost is \$4.

**Defensive driving** — Learn to drive safely and qualify for a 10% reduction in auto insurance rates for the next 3 years. This all-day Saturday class meets from 8 a.m. to 5 p.m. April 25 and May 30.

**Pre-season softball tournament** — A Men's Open C Softball Tournament has been scheduled for April 4 and 5. Trophies will be awarded to the top three teams. Individual trophies and MVP awards also will be given. Entry fee is \$95. Registration deadline is April 1.

## Good advice available on retirement

JSC employees who must choose between two retirement plans this summer can take comfort from the fact that Personnel's retirement counselors recently received a Group Achievement Award "for excellence and professionalism."

Recipients of the award, presented Feb. 23, were Diane Trahan, Dianna Mancuso, Marilyn Dotson, Shirley Newsom, Sylvia Buchta, Laura Collins, and Leah Hoover.

Retirement planning and counseling have become more complex since Trahan began explaining benefits to small groups of interested employees in 1969, when the retirement system was amended. The complexity stems from the availability of two systems — the old Civil Service Retirement System (CSRS) and the new Federal Employees Retirement System (FERS). Personnel's Training Branch offers a retirement seminar which helps employees prepare for retirement. Trahan said plans are underway to expand the seminar to include more financial planning. She suggests that employees enroll in one of the sessions at least 10 years before planned retirement in order to get the full counseling benefits.

In order to stimulate thinking about comparisons of the CSRS and FERS, Trahan's group has prepared numerous handout materials and the summary of personal benefits information which was recently distributed. Also, a Thrift Savings Plan (TSP) brochure has been sent to employees. In an effort to provide as much information as possible, the Personnel Management Specialists (PMSs) are



Members of the Personnel retirement counseling staff are: back row left to right, Dianna Mancuso, Shirley Newsom, Sylvia Buchta, and front row, Diane Trahan, Marilyn Dotson, and Laura Collins.

briefing groups of employees on the new retirement system.

The information is intended to help employees establish retirement priorities based on their individual circumstances. Planned retirement age, requirements for survivor and disability benefits, ability to save voluntarily, Social Security situation and plans to work after retirement are examples of things to consider when assessing retirement options.

Software for making financial comparisons will be available in June. The Office of Personnel Management (OPM) also will be providing transfer handbooks in June. The retirement counselors will be trained by OPM on the transfer provisions by the time the software and handbooks are available.

"At NASA, we feel that (June) is a little late to begin planning. That is why we are going ahead with our presentations and distributing handouts ahead of time," Trahan said.

"The Thrift Savings Plan is probably one of the major features that

will attract the CSRS employees to transfer over because it is a tax-deferred plan and the tax laws right now make it rather attractive," Trahan said. The TSP is only one of the three tiers of the FERS plan that also includes the Social Security and retirement plan.

"There are three funds in the thrift plan, but this year you will only be able to participate in the FERS plan so the TSP booklet is only good for this open season. We only get to choose whether we are going to participate and how much, not which savings plan," Trahan said.

The open season for transferring to the new system will be July through December.

"Once you make your decision, that's it. You have no option to change your decision. It's irrevocable. That's why we are trying to provide as much information as possible," Trahan said.

All benefits counseling is strictly confidential and employees with questions are encouraged to call the retirement office at x32135.

## Shapley is new Associate Deputy Administrator

Willis H. Shapley has been appointed Associate Deputy Administrator (Policy) at NASA Headquarters to advise the Administrator and Deputy Administrator on policy, external affairs and related matters.

The new, third-ranking position was established in the organization plans that followed recommendations of the NASA Management Study Group. It is designed to ensure effective use of staff and

program office resources.

Shapley returns to NASA following a September 1975 retirement. Since then, he has been a consultant to the NASA Administrator, the American Association for Advancement of Science, the Office of Management and Budget, the Office of Science and Technology Assessment and other organizations.

Shapley entered government service in 1942 with the Bureau of the

Budget, Executive Office of the President, where for 23 years he specialized in research and development, national defense and space programs. In 1965, he arrived at NASA Headquarters as Associate Deputy Administrator, a post he held for 10 years. He was the senior NASA representative in the Soviet Union during the joint US-USSR Apollo-Soyuz space mission in July 1975.

## NETs do more than solve problems

(Continued from page 1)

He shared three personal lessons he had learned:

"First, no matter how good you think you are, you can find ways to improve. Second, even in a technical organization, NETs can work if the problems are defined properly. Third, it turns out that our division problems are not unique. Therefore the work of our NET may be useful for others and we should examine the work of other NETs to see whether their experiences can be transferred to our situation."

Harvey Hartman, chairman of the JSC NET Steering Group, presented an overview of the NET program and served as master of ceremonies, and R. Wayne Young, deputy director of administration, read award citations during the

presentations.

Team leaders or alternates accepting awards on behalf of their NETs included: Al Cornelius, BE Advisory NET; Grady Owens, Facilities Design Division NET; Kevin Lesenski, Machine Branch NET; Eleanor Der Bing, Promoting Efficiency Procurement NET; Doug Peterson, Personnel NET; Coy Martin, Quality Assurance Division NET; Greg Barbour, Solutions Through Employee Participation (STEP) NET; Bettye Solcher, BA Office Proficiency NET; Bob Wilson, Provisioning Order NET; Carolyn Lowrimore, Secretarial Development NET, and Glory Allahverani, Technical Services Integrated NET.

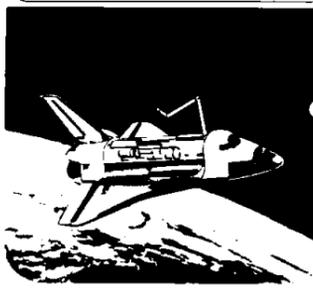
Also accepting awards were Jean Ellis, Astronets; W.T. McPeters, Barrios and NASA Departmental Interactive Team (BANDIT); Joan

Baker, Research and Engineering Business Management Office and Lockheed NET; Joe Bores, Flight Training NET; Burl Kirkland, JSC/Boeing FEPC NET; John Chesler, Logistics Division NET; Ted MacDonald, NASA-JSC Exchange NET; Greg Boegner, Public Affairs Office NET; Chris Hazelton, Pressure Systems NET, and John Stanley, Solar System Exploration Division and Lockheed NET.

Contractor representatives at the ceremony included Emyre B. Robinson, Barrios; Larry Elton, Boeing; H.N. Bowes, Lockheed; Gary Morrison, Media Services; Barry Turney, Northrop; Brian Porr, Omniplan Corp.; Clarence Abadie, Pan American World Services; Frank Fort, Pioneer Contract Services, and Tom S. McClure, RSOC.

NASA  
Lyndon B. Johnson Space Center

## Space News Roundup



The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. Roundup deadline is the first Wednesday after publication.

Editor ..... Brian Welch  
Assistant Editor ..... Kelly Humphries

# TRUST is a MUST

"The crew has to believe you when you say, 'That is the best way to do it.'"



Members of SMS Training Team 9 coordinate simulated malfunctions during a script-writing session for the STS-26 crew. From left are Bill O'Keefe, Darrel McGregor, Stephen Messersmith and Rick Bush.

**T**rust — according to the Shuttle Mission Simulator training team instructors working with the STS-26 crew — is an essential part of good training. But it is also something that must be earned.

"The crew has to believe you when you say 'That is the best way to do it,'" said Bill O'Keefe, the team's control/propulsion instructor. "It takes a while to develop that trust."

Trust comes through demonstrating competency and subject knowledge, communicating on the same level, avoiding answers that just "sound good," and getting to know each other as individuals.

"We don't expect them to know all the answers," said Commander Rick Hauck. "But we depend on them to defer answering questions until they are confident they have the correct answers."

The recently assigned members of the Shuttle Mission Simulator (SMS) Training Team 9 were chosen because of the trust they earned training previous missions. Team 9 consists of team leader Rick Bush and instructors Stephen Messersmith, Data Processing Systems and Navigation (DPS/NAV); Darrel McGregor, Systems; Bill O'Keefe, Control/Propulsion (Control/Prop), and Air Force Capt. Mae Black, Communications (COMM).

Although they have been working with the STS-26 crew for several weeks, the relationship between crew and instructors is still in its infancy.

"We're just getting to know each other," said Bush, who was the control/propulsion instructor for missions 51-B and 51-J. "Our training methods vary according to the personality of the crew. We have to mold a training program to the personal contacts."

Trust is especially important between the crew and the SMS training team because it is the team leader who coordinates and executes all of the SMS sessions each crew goes through in its year of rigorous mission preparation and it is the training team that works the console during these sessions that fully simulate the mission's critical flight phases.

"Overall, the SMS is the premiere facility," said Frank Hughes, chief of the Flight Training Branch. "It's the highest priority that every crew puts on its training."

"The training we get in the SMS is mandatory for flight," Hauck said. "It is absolutely essential."

"Over the years we have used crew feedback to the folks who provide the motion cues and aural cues such that at this point I think we have an excellent sim in that respect," Hauck added. "We also find that the SMS is essential for providing a place to verify the procedures we use in flight and it

has provided us with an excellent facility to get shelf-life or maturity in flight software."

All that equipment and the \$5,000-an-hour SMS sessions still depend on people to design the simulated missions, develop the training software loads and insert the malfunctions that put the astronauts to the test.

"I'm very pleased with the experience level and the quality of the training instructors that we have," Hauck said. "They are all very knowledgeable and professional in their approach to our training task."

As team leader, Bush is working closely with Hauck to design a training program that fulfills all the objectives in the NASA-approved Shuttle Training Catalog and prepares the crew for any contingency. They will continue to map out the most productive scenarios for training five veteran astronauts until their launch.

"This crew has been through so much and they're so good, it's tough to show them something new," said Bush, who was the control/propulsion instructor for missions 51-B and 51-J. "We really have to burden them sometimes to make it a learning experience."

Bush also serves as liaison with the training manager, Dudley Long, who develops the schedules the crew uses to budget its time in the SMS and other training facilities. Bush makes real-time adjustments to changes in the Shuttle program, staying current with changes in the Flight Data File and Orbiter hardware and software to be sure all training is based on the most current procedures and capabilities. During console

sessions he coordinates with the SMS operators who enable the aural, visual and motion cues of the simulator.

O'Keefe, as Control/Prop instructor, trains the crew in the Shuttle's main propulsion system, orbital maneuvering system, reaction control, flight control and portions of guidance and control.

Messersmith's duties as DPS/NAV instructor cover two separate areas. A veteran of 61-B training, he trains the crew to understand the operations of the Shuttle's five General Purpose Computers (GPC). These include the primary and backup flight systems, and the numerous interfaces between the computers and other Shuttle systems. In addition, he trains the crew in the management of navigation systems.

**B**lack will train the crew to effectively use all of the communication systems that provide two-way voice and data transmissions between the Shuttle and ground stations, payloads and EVA (extravehicular activity) astronauts. She will train the crew in the use of S-band, KU-band and UHF linkages and Shuttle internal communications.

The five main systems that McGregor teaches the crew about are electric power production and distribution, environmental control and life support, auxiliary power units and hydraulics, mechanical systems, and caution and warning systems. McGregor worked with the 61-C crew.

Crew training usually starts out general and works up to specifics. But the experienced STS-26 crew members already know the generalities and many of the specifics, so the training team

initially is throwing a broad range of problems at them to determine their strengths and weaknesses.

"I'll spread out my bag of tricks and see how they react to them," Messersmith said. "I'll see where they're weak and where they're strong. Already I'm finding that I'm going to have to work to challenge them. From now until the day we fly my job is to get them to know my systems well enough to anticipate the next worst-case failure and be prepared for it."

"We try to overstress the crew," Hauck said. "When we get into integrated sims, we try to train to a level of failures that is much greater than we would expect on any mission. We try to provide a margin of knowledge and experience that will make any level of failures that we might see in flight well within our experience base."

Right now, the STS-26 crew members are spending four hours a week in stand-alone SMS sessions. As the launch date nears, they will spend more time in stand-alone SMS sessions, and begin integrated sims that link the SMS and other stand-alone trainers with the Mission Control Center through the Network System Simulator. The crew also will work with experts on its payload, the Tracking and Data Relay Satellite, during stand-alone and joint integrated sims.

Initial SMS stand-alone training will be provided by Air Force Capt. Stu Keister.

For SMS Training Team 9, preparation for each of the weekly sessions begins almost the minute the previous session ends. They take the lessons they learned about the crew's proficiency and begin to design new scenarios for the

following week's session. Each instructor thoroughly researches the malfunctions, or "mals," planned for the session and a "bag of tricks" to a script-writing session in Bldg. 4. There, they cooperate to ensure that no instructor ruins another's training objectives by overtaxing the astronauts or putting in malfunctions that make it impossible for them to learn.

"You've got to let them think about what they're doing," McGregor said. "They can't just be blindly doing switch throws, that doesn't help them."

**A**ll of the instructors agreed that the most "fun" part of their jobs is interacting with the crew during SMS sessions. As they sit at their consoles in Bldg. 5, light pens poised on computer screens prepared to "throw in" a malfunction that should be especially challenging, their eyes almost twinkle in anticipation.

"In some ways it becomes a contest between two friends," O'Keefe said. "I'm saying, 'How long is it going to take them to figure this out?' and they're up there saying, 'OK, what's O'Keefe doing?'"

"You want to give them something sneaky, but something that's realistic," McGregor said.

Those "sneaky" malfunctions teach the crew how tiny problems can have grave consequences. During one recent SMS session, the training team put in a malfunction based on the premise that a tiny piece of solder had kept the switch used to select abort modes from working properly. As a result, the primary GPCs told the crew to return to the launch site (RTLS) while the backup flight system (BFS) told them to do a trans-oceanic abort landing (TAL). The crew had to take action to match the backup flight system (BFS) with the primary GPCs to retain the capability of engaging the BFS.

"It's a game in a sense, but it's a learning experience," added Messersmith. "If you can come up with a fun way for them to learn then it's not a task."

Teaching crew members about computers, systems and flight characteristics are not the only training objectives, either. Part of the training team's job is teaching the crew how they can work together, Bush said, particularly the Commander, Pilot and Mission Specialist 2, who sit together on the flight deck.

"Those three are almost like an orchestra," O'Keefe said. "They have to work separately and yet together. We have to figure out how to train them to work like that."

In the end, though, results are what really matter.

"The most rewarding part of being an instructor is the product," Bush said. "We get the crew trained for their launch and they make us look good because they've done well."



Messersmith, O'Keefe and McGregor sit at their instructor stations in the motion-base Shuttle Mission Simulator control room as team leader Bush stands to get a better vantage. From their consoles, instructors can communicate with the crew and view the flight data being displayed in the simulator. Using light pens or keyboards, they can insert planned malfunctions or create new problems on the spot.

# Roundup Swap Shop

All Swap Shop ads must be submitted on a JSC Form 1452. The forms may be obtained from the Forms Office. Deadline for submitting ads is 5 p.m. the first Wednesday after the date of publication. Send ads to Roundup, AP3, or deliver them to the Newsroom, Bldg. 2 Annex, Room 147. No phone in ads will be taken.

## Property & Rentals

Sale: Custom-built 3,100-sq.-ft. house across from water, large wooded lot, 4-2.5-2, all large rooms, 4 walk-in closets, floored attic, many decorator features. \$149,000. Jerry, x38922 or 474-4310.

Lease: Nassau Bay, 2,200-sq-ft. townhouse, 3-2-2 plus study, new carpet, paint, large garage, deck, atrium, 20-ft. FPL, \$890/mo. Jerry, x38922 or 474-4310.

Sale: Center, Texas, 420 acres (300 timber, 120 pasture), half of mineral rights. 482-4365.

Sale/lease: 2-2.5-1+1 townhouse, 1,630 sq. ft., clean, ex. cond., 2 miles to JSC, \$1,500 assumes FHA no-approval loan, \$58,000 balance, \$679/mo., lease \$600/mo. 333-2636.

Rent: League City waterfront townhouse on marina, 2-2, FPL, loft, W/D, tennis, pool, no smokers, no pets, available April or May. \$800/mo. plus utilities, unfurnished, will consider furnishing. 554-6907.

Sale/lease: Heritage Park (new section) 3-2-2, ex. cond., covered patio, FPL, \$5,000 equity and assume \$57,000, 10% FHA no approval/escalation, lease \$600/mo., 326-5754.

Lease: Baybrook condo, El Dorado Blvd., downstairs, end unit, FPL, W/D, \$300/mo. plus deposit. Danny Taylor, 326-5754 or x39670.

Rent: New Orleans French Quarter condo, Jazz Festival week, April 24-May 1, Greek revival townhouse, private rooftop sundeck, fully furnished, kitchen, sleeps 4-plus. 280-3649 or 480-5656.

Lease: CLC Baywind II condo, 1 BR, drapes FPL, kitchen appliances, tennis, pool, \$275. 488-5019.

Rent: Baybrook condo, 1-1-1cp, W/D, refrig., tennis, \$270/mo. Gary, 333-6214.

Rent: Room in CLC-Middlebrook home, kitchen privileges, female, \$200/mo., 488-8086 or 282-4699.

Sale: Camino South, 3-2-2A, formal living, covered patio, storm windows, low equity, \$69,500. Andy or Kevin, 280-1746 or 280-9861.

Rent: Baywind I condo, 1BR, mini-blinds, pool, new paint, pets OK, on-site laundry, \$260/mo. 282-3285 or 486-5784.

Sale: Baywind II 1-1 condo, FPL, mirrored walls, miniblinds, fans, W/D connections, assumable loan. 471-6814.

Lease: Bayridge 3-2-2A, FE, FPL, central A/H, no pets, refrig. 488-1301.

Lease: Baywind I 1-1 condo, all appliances, pool, game room, tennis, \$348/mo. plus 1 mo. deposit. Walt, x36353 or 532-4766.

Sale: Univ. Trace townhouse, 2-2.5-2cp, all appliances, FPL, security system, under \$50,000 assumption. 333-4044.

Lease: Baywind II condo, 1-1, FPL, all appliances, pool, game room, tennis. Jim Wiltz, x39009 or 944-0451.

Lease: Univ. Green 2-2.5-2 townhouse, refrig., W/D, FPL, miniblinds, microwave, fans, small yard with deck, \$650/mo. Cindy, x32998 or 486-8266.

Lease: West Galveston Island beach house, 3-2, furnished, day, week, month. Ed Shumilak, x37686 or 482-7723.

Lease: Condo on Clear Lake. 24-hr. security, pool, tennis, 2-2, \$400 plus utilities. 480-5583 or 482-7156.

Sale: 1.5-story Ryland Blanco in Pipers Meadow, master down, 2 up, 2.5 baths, FPL, wet bar, fans, loft, formal dining, large breakfast room, upgraded carpet, 10x20-ft. patio, fenced, \$84,500. Sharon or Doug, x35452 or 480-2313.

Sale/lease: El Dorado Trace condo, 2-2.5-2, fully furnished, stereo, TV, waterbed, 2 phones, cable, utilities paid, rent \$695/mo., sell all \$54,500. 438-2262 or x35555.

Sale/lease: Baywind 2BR condo, all appliances, W/D connections, fans, storage room, pool, next to NASA, \$350 plus deposit. 488-0719.

Sale/lease: Austin UT condo, 1-1, 4 blocks from law school, assume loan, no equity. B. Craig, x34158 or 420-2936.

Sale/lease: Forest Bend townhouse, large 2BR, private courtyard, quiet, spacious, miniblinds, \$425 down, \$425/mo. Glen, x36541 or 486-0462.

Sale/lease: Kemah/Bayview brick 3-2-2, large lot, built-ins, central A/H, CC schools. \$425 down, \$440/mo. Glen, x36541 or 486-0462.

Rent: Rooms in Friendswood home, wooded area, unfurnished, male or female, utilities, W/D, microwave, hot tub, cable, \$225/mo. Rowena, x32349 or 996-9249.

Lease: Lake Livingston waterfront house, 3-2, sleeps 8, fully furnished, pier, ex. fishing, skiing, swimming, weekend or weekly rates. 482-1582.

Rent: Lake Livingston cabin, Betheny Creek area, furnished, sleeps 6-plus. 482-3824.

Lease: Middlebrook II 3-2-2, formals, FPL, fence, fans, good cond., \$625/mo., \$625 deposit, references. 486-8551.

Sale/lease: El Dorado Trace 2-2 condo, Greenbelt area, appliances, FPL, fan, security system, pools, workout facilities, \$33,500 or \$420/mo. Dan, 480-6913 or 757-2398.

Sale: Meadowbend 3-2-2, brick, central A/H, all electric, drapes, FPL, built-ins, formal dining and living, landscaped, security system, fans, \$68,500. x32739 or 438-1038.

Rent: Galveston by the Sea luxury two BR condo, fully furnished, two nights, weekly, monthly, yearly rates. Jay Clements, 474-2622.

## Cars & Trucks

'78 Chevy Malibu Classic station wagon, A/C, PS, PB, radio, good family car, \$1,500 OBO. Walt, x36353 or 480-9280.

'84 Maserati Biturbo 4-pass. coupe, ivory/tan leather, alloys, PW, PL, AM/FM/cassette, alarm, 32K mi., ex. cond., \$15,500. Ed, 280-1680 or 486-8847.

'84 Ford LTD, ex. cond., 24K mi., auto., PS, PB, AM/FM, 6 cyl., white, 4-dr., \$5,500. Trout, x39059 or 944-3959.

'79 Ford Granada 2-dr., A/C, PS, PB, AM/FM cassette, auto., low miles, \$1,695. Jim, 282-3183 or 482-2941.

'84 Chevy Cavalier hatchback, 2-dr., 5 spd., cobalt blue, velour, AM/FM/cassette, cruise, A/C, ex. cond., \$3,900. Cindy, 240-1674.

'80 Subaru GL, 4-dr. sedan, beige, 5-spd., A/C, AM/FM/cassette, cruise, 82K mi., one owner, \$1,900. Jeff, x38312 or 482-5393.

'85 Chevy Cavalier, 2-dr., auto., cream, velour, AM/FM/cassette, cruise, A/C, low miles, ex. cond., assume payments \$211.97/mo. Mildred, 486-2153 or 409-935-1826.

'76 Porsche 914, 2.0, ex. cond., no rust, no damage, best 914 you'll find, \$7,500. 554-7277.

'74 VW Super Beetle, mechanically overhauled, needs body work, \$1,000. Lynda, x38296.

'72 Pontiac Granville, 33K miles, PS, PB, A/C, AM/FM, orig. owner, BO. 946-4752.

'82 Corvette, silver/burgundy, loaded, new tires, 13.9K mi. 487-2383.

'81 Honda Civic, 1,500cc, A/C, cassette, looks good, runs great, \$2,800 OBO. Karen, x38850 or 520-8348.

'61 Apache 10 Chevy pickup, 305 V8, needs safety sticker, license, \$700 OBO. 332-3989.

'86 Buick Somerset, AM/FM/cassette, A/C, cruise, ex. cond., \$8,750. 482-6462.

'84 Pontiac Fiero SE, A/C, 4 spd., AM/FM/cassette, 45K mi., \$6,500. Rick, 282-2714 or 559-2735.

'78 Ford LTD station wagon, ex. cond., auto., A/C, luggage rack, towing package, 400c.i. V8, 9-passenger, AM/FM/tape, \$1,800 OBO. Frank, x35233 or 482-5777.

'79 Datsun 280ZX, A/C, PS, PB, PW, cruise, AM/FM stereo, rustproofed, undercoated, 56K mi., one owner, \$4,000. MN. Beaty, x31714 or 488-4657.

'82 280ZX Coupe, 5 spd., A/C, PB, PW, PL, PM, cruise, T-tops, AM/FM/cassette, white w/red suede leather interior, 83K mi., \$6,000. Craig, 450-2336.

'74.5 260Z, clean, new struts, springs, muffler, steering, carburetor, \$3,500. 486-7704 or x34256.

'77 Olds Delta 88 Royale, \$975. John K. Greer, Bldg. 4, Rm. 101, 483-0762 or 438-2327.

'77 Chevy three-quarter-ton window van, dual A/C, PS, PB, AM/FM, cruise, steel radials. Dick Sauer, x37121 or 554-6290.

'81 Chevy Malibu Classic, 4 dr., A/C, silver gray, maroon velour interior, high miles, runs good, \$1,500. x30454 or 554-7083.

'72 Triumph Spitfire, white, new clutch, new top, new Pirelli P3 tires, 70K mi., some rust, runs good, \$1,100. Class Mike, x37667 or 554-6291.

'83 Chevy Capr. Classic, 4 dr., 3.8 V6, power, A/C, tilt, cruise, good tires, new brakes, timing belt, license sticker, safety sticker, 74K mi., \$3,650. Clay, x34568 or 481-1507.

'85 GMC Starcraft Vandura, 13.5K mi., loaded, metallic brown, 5.0-liter V8, Chapman alarm system, ex. cond., \$18,000 OBO. Ray, 554-4203.

'84 Pontiac Fiero, red, 4 spd., 21,000 mi., extended warranty, \$5,500. Marie, x38875 or 480-4507.

'85 Nissan 200 SX Coupe, metallic burgundy, cloth interior, 17K mi., extended warranty, dependable, needs new radio, \$8,550. 282-3972.

'81 VW Rabbit diesel, 4 dr., silver, sunroof, AM/FM stereo, A/C, 150K mi., dependable, ex. cond., \$1,200. David, x30298 or Linda, x33550.

'80 Volkswagen Rabbit, 4 dr. diesel, 4 spd., A/C, great gas mileage, ex. cond.,

'75 Plymouth Sport Fury, 2 dr., V8, auto., PB, PS, A/C, AM/FM, gold interior and exterior, vinyl seats, vinyl top, 67.4K mi., ex. cond., \$2,000 OBO. Dick x32141 or 482-1156.

'86 Toyota Corolla, 4 dr., auto., A/C, PB, PS, cruise, AM/FM/cassette, 5-year unlimited mileage transferable warranty, looks new, 13K mi., \$9,700 OBO. 282-3494 or 484-3683.

'81 Ford Mustang, hatchback, T-top, 5 cyl., auto., A/C, PS, AM/FM/stereo, 72K mi., \$2,450 OBO. Rich, x30685 or 480-1805.

'81 Ford Mustang, hatchback, T-top, 5 cyl., auto., A/C, PS, AM/FM/stereo, 72K mi., \$2,450 OBO. Rich, x30685 or 480-1805.

## Boats & Planes

Ebbtide Captiva 18-in. walk-through, 140hp Mercury 1/0, galvanized trailer, ex. cond., stored in garage, \$4,450. 474-3651.

23-foot power, cabin, sleeps 4, head, galley, stove, refrig., 228hp Mercruiser I/O, trimtaps, depth finder. x39199 or 332-4081.

Alcott Sunfish, sails, ex. cond., \$550. 474-3651.

'83 16-ft. Hobie Cat Special Edition, multi-colored sails, galvanized trailer w/custom boat box, many extras, stored indoors, \$2,990. Carla, x30181 or 538-1148.

Chrysler outboard, 50hp, \$435. B. Reina, x31588.

VW airboat kit for aluminum boat, cage, engine, electric start, 48-in. propeller, gauges, lights, needs work, \$200 OBO. Quinn, x30765 or 482-2821.

Renken outboard 15-ft. fiberglass boat and Little Dillie trailer, walk-through windshield, \$600. x31559 or 482-7140.

Airplane project, Sonera 2LS Formula Vee racer, fuselage 90% complete, Cleveland hydraulics, 2,180cc VW engine w/forged 4340 chrome molly crank. Bill, x36311 or 473-7129.

NOMAD ultralight aircraft, tricycle landing gear, three-axis control, double spar wing, covered both sides, \$2,000 enclosed trailer extra. 480-6431.

## Cycles

'82 Yamaha Seca 550, 7K mi., bright red, ex. cond., \$1,550. Bob Orahood, x36939.

'79 Honda CX500 custom w/fairing, hard saddle bags, luggage carrier, good cond., dependable, \$1,100 OBO. Rich, x36900.

'80 Kawasaki 1300 touring motorcycle and '86 Shoreline trailer, AM/FM/cassette, radar detector, 2 helmets, bike cover, ex. cond. David, x39566 or 538-1002.

'81 Honda CB750 Custom, new battery, 7,030 mi., recent tune-up, manual, tool kit, ex. cond., \$1,200 OBO. 480-5527.

Men's 10-spd. bicycle, red, ex. cond., \$70. Lee, x36186 or 488-7646.

'77 Honda Goldwing GL 1000, red, Vetter equipped, \$1,950. x32739 or 538-1038.

'80 Kawasaki, 750 cc, windjammer, new Dunlop Touring Elite tires, 19K mi., black, ex. cond., \$975. Joe Gildo, x36939.

'83 Honda 650 Nighthawk, 3,100 mi., garaged, ex. cond., new battery, maroon w/matching helmet, \$1,450 OBO. Rich, x30685 or 480-1805.

## Audiovisual & Computers

Dokorder 4-track reel-to-reel, ex. cond., \$225; Akai 2-track reel-to-reel, \$50; Sharp cassette deck, \$50. Bill, x32602 or 335-1464.

Computer equip., 8-in. DSDD drive subsystem, \$900; 5.25-in. DSDD drive subsystem, \$150; H-19 terminal, \$200; s-100 16-bit computer boards, cabinet, BO. Chuck, 280-1667.

AT&T 6300 PC, mono., 2 floppies, 640K RAM, manuals, was \$2,500, now \$1,300 OBO. Mike Jones, x34378 or 486-4983.

Apple IIe, enhanced, monitor, duo-disk, parallel printer card, modem, dust cover, software (PFS Write, Managing Your Money, Print Shop, Games). Jeff, x37999 or 488-2405.

Big board Z-80 computer, dual 8-in. disk drives, monitor, keyboard, \$450. 334-4894.

Commodore 128 computer, 1571 disk drive, 1701 color monitor, parallel printer, interface cable, \$495; NEC amber monitor w/interface cable for Commodore 128, \$50. 481-0468.

Ohio Scientific personal computer, color, one floppy disk drive, 8-channel analog input, 2 channel analog output, assembler, \$200 OBO. C. Deiterich, 482-1859 or x31912.

Teac A-106 stereo Dolby tape deck, ex. cond., \$75. Gerry, x39805 or 486-0889.

JVC LL-1 linear-tracking turntable, Audio Technica VS-225EP cartridge, ex. cond., \$90. Joe, x31597 or 996-1667.

## Household

Frigidaire drop-in electric range, \$50; Waste King dishwasher, stainless steel interior, \$50. x30454 or 554-7083.

White wicker headboard, ornate, full size, \$75; 3-drawer white wicker chest, \$75; stoneware, 40 pieces, \$20; Fulmer motorcycle helmet, large, black, \$65. Jana, x51653 or 480-5527.

Princes House crystal; Dakota River Break king-sized bedspread. Theresa, x58301 or 488-4521.

Full-sized mattress, good cond., \$40; wrought iron Spanish dinette set, \$50; recliner, \$50; inflatable raft, motor mount, paddles, wooden floor, \$50; Atari 800XL computer, disk drive, some games, \$75. 486-5351.

Two 10-gal. aquariums, stand, fluorescent hoods, filters, ready for fish, \$30 ea. or \$50 pr. LaVon, 486-5351 or x30351.

Queen-sized Sealy Royal mattress, springs, wheeled frame, linens, new mattress cover, ex. cond., BO. Ed, x38309.

Tomlinson tuxedo-style sofa, 86-in., 3 loose cushions, back cushions, good cond. Redmond, x33604 or 333-4534.

King-sized waterbed, padded sideboards, new mattress, no heater, \$75. Melissa, 554-4746.

GE electric range, \$150; small sofa hide-a-bed, \$50; round formica dining table, 4 swivel chairs, \$50; round love seat, \$50. 488-1665.

Montgomery Ward microwave oven, 2 cu. ft., standard functions, 1 yr. old, ex. cond., \$150. 488-5533 or x36621.

Six-ft. curio cabinet, glass shelves, lights, mirrors, \$75; stereo cabinet, glass door, \$25; parsons bench, \$25; 6-ft. bookcase, \$10. Bob, x38296.

Four-pot set of Farberware cookware, \$25; Corelle dinnerware serving for 4, some extras, \$20; silverware, serving for 8, \$5. Bob, x38296.

Solid oak desk, 36 x 60-in. top, 5 drawers, \$200; GTE touch-tone desk phone, \$25. 332-2229.

Singer sewing machine, 6235N, brand new, never used, was \$400 now \$340. Whitnah, x36607.

Twin beds, frames attach to long maple headboard, swing open at foot, together make king-sized bed, good cond., \$150. Paul, x36813.

King-sized waterbed, all natural finish, 12-drawer pedestal, bookcase headboard, heater, bedspread, sheets, was \$1,000 now \$500. Ernie, x36893 or 485-2287.

## Photographic

Complete color darkroom, enlarger, analyzer, digital timer, processing reels, paper processing drums, slide copier, easels, paper safes, etc., was \$1,800 now \$850. Chip, x37705 or 554-6634.

Canon AE-1 w/f1.8 50mm, f4.0 35-70mm, f5.6 100-200mm lenses, power winder, speedlite, tripod, access., \$450. Nering, x31382 or 481-0608.

Canon A1 w 135mm f2.5 lens and 35-70mm zoom w/macro, \$165. 488-3941.

Nikon FM manual camera, wide-angle (28mm f3.5) lens, \$120. 488-3941.

Yashica 8mm auto. exposure movie camera w/light, \$25. 332-2229.

## Wanted

Want child's car seat, up to 40 lbs., stroller, high chair in reasonable cond. Carla, x30181 or 538-1148.

Want female roommate to share 2-2 apartment, W/D, cable, FPL, more, \$207.50/mo. plus half utilities, references required. x36147 or 480-6792.

Want TI 99/4A, RS-232 interface, prefer stand-alone. William Gravett, x30842.

Want female to share 3BR apartment w/2 other females in CL area, all utilities but phone paid, \$229/mo. Debbie, x32127 or Diane, x31332.

Want male or female roommate to share 3-2 house in CLC, household privileges, \$250/mo. Stephanie, 488-5967 or 644-1778.

Want carpool from Alvin to JSC, 7 a.m.-3:30 p.m., non-smoker. x38037.

Want three or four-drawer student desk, good cond. Randy, x32570.

Want engineers for speech recognition experiments, send name and phone number to Mark, EE-2.

Want roommate, male or female, to share 3BR house in League City, household privileges. x39199 or 332-4081.

Want Mistral superlight. Bullock, x30026 or 488-6526.

## Pets & Livestock

Finch collection w/cages, accessories. Theresa, x58301 or 488-4521.

4-yr.-old Rod Dun gelding, 14 hands tall, gentle, kids' horse, \$500. Doug, 479-0322 or Don, 480-6250.

Chowdoby puppies, puppy shots, tails

docked, 4 females left, \$25 ea. 482-3817.

Free AKC Cocker Spaniel, white/buff, ex. health, spayed, female, loves everyone but toddlers. Kathie, x32483 or 488-7572.

Siamese kittens for sale, purebred, Steve, x32530 or 326-2174.

Free small black mixed-breed dog, playful, lonely. x32456 or 996-0501.

Free gold male cat, neutered, declawed, shots, 2 yrs. old. x34618 or 486-1058.

AKC German shepherd pups, born Jan. 24, tan and silver. Billie, x38334 or 482-4365.

## Musical Instruments

Fender Mustang guitar w/case, Peavey Backstage amp., \$300. 488-1665.

Fender Stratocaster, hard case, Peavey amp., \$450. Cindy, x34165.

Oration 6-string classical guitar, ex. cond., tonal quality, case, \$350. Ernie,